

a pressure shell;

a cooling wall;

a water-cooled cooling gap between the pressure shell and the

cooling wall;

a ceramic protection for the cooling wall; and

a layer of slag, pressure and temperature of the cooling gap

between the pressure shell and the cooling wall being controllable so that the reactor can be operated above and below a boiling point of cooling water, pressure in the cooling gap being higher than pressure in the gasification chamber.

7. An appliance for gasification of carbon-containing, ash-free fuel, residual and waste materials using an oxygen-containing oxidizing agent at temperatures above 850°C and at pressures between atmospheric pressure and 80 bar, comprising a reaction chamber designed as an entrained-bed reactor having a contour delimited by a cooled reactor wall of the following structure, from the outside inward:

a pressure shell,

a cooling wall,

a water-cooled gap between the pressure shell and the cooling wall;

a ceramic protection for the cooling wall, and

a refractory lining, the cooling gap between the pressure shell and the cooling wall being operable, with a filling of pressurized water, above or below a boiling

point of the cooling water, pressure in the cooling gap being higher than pressure in the gasification chamber.

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8. An appliance as defined in claim 6, wherein the cooling wall comprises half-tubes which are welded together in a gastight manner, are pinned and are coated with a thin layer of ceramic mass with a high thermal conductivity.

9. An appliance as defined in claim 7, wherein the cooling wall comprises half-tubes which are welded together in a gastight manner, are pinned and are coated with a thin layer of ceramic mass with a high thermal conductivity.

10. An appliance as defined in claim 8, wherein the thin layer of ceramic mass is a flame-sprayed layer on the cooling wall.

11. An appliance as defined in claim 9, wherein the thin layer of ceramic mass is a flame-sprayed layer on the cooling wall.

12. An appliance as defined in claim 6, wherein the cooling wall has geometric shapes.

13. An appliance as defined in claim 7, wherein the cooling wall has geometric shapes.